Space Weather Forecast

Issued on Wednesday 1 January 2025 at 13:26 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts expected with a slight chance of Strong blackouts. Ongoing influence from a Coronal Mass Ejection sees G1-G2 Minor/Moderate storm conditions likely, with a slight chance of Strong storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with three Moderate class flares during the past 24 hours**,** the peak flare originating from a relatively small and moderately complex region in the northwest. The most magnetically complex region on the disc, located in the northwest and approaching the limb, produced the majority of the flare activity, including a long duration M-class flare.

There are currently ten sunspot regions on the visible disc. The region in the northwest that produced the peak flare is the largest and most active region but has been relatively stable in terms of growth over the last 24 hours, possibly declining a little. Further complex groups lie in the southeast and the central northern hemisphere. Several initially small regions on the disc have shown recent development. The remaining regions are all relatively simple or only slowly evolving.

A possible filament lift off near the centre disc is undergoing further analysis to diagnose any Earth-directed material.

Solar Wind / Geomagnetic Activity: The first Coronal Mass Ejection (CME) arrived at Earth at 31/1626 UTC with the second CME arriving at Earth by 01/0215 UTC. Solar wind speeds initially were at background levels around 350-380km/s soon increasing to around 450km/s with the arrival of the first CME, then the second CME saw winds increase again, this time to elevated levels around 520km/s. The Interplanetary Magnetic Field (IMF) was Moderate quickly rising to Strong with the initial CME arrival, slowly dipping back to Moderate before rising again to Strong for the second CME. The north-south component was variable at times before trending strongly negative by the end of the period. Geomagnetic activity increase from Quiet (Kp1) to G2 Moderate storm (Kp6) by the end of the period.

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) at GOES18 remained at background levels throughout, well below the 1-pfu S1/Minor Radiation Storm threshold.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

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Four-Day Space Weather Forecast Summary

Solar Activity: Generally Moderate solar activity is forecast with isolated Moderate-class flares likely, and a slight but declining chance of isolated Strong-class flares, mainly from the region in the northwest which will rotate of the western limb in the forecast period.

Solar Wind / Geomagnetic Activity: Ongoing influence from the two partial halo CMEs that arrived on 31 Dec and early hours (UTC) of the 01 Jan will gradually wane through 01 Jan. There are no other Earth-directed CMEs in the forecast. By the end of the forecast period we may see a connection to a fast wind causing an enhancement to the geomagnetic activity.

Initially geomagnetic activity is likely to be G1/G2 Minor to Moderate (Kp5-6) with a slight chance of G3 Strong (Kp7) storm intervals, this is expected to ease to Unsettled (Kp3) with a chance of G1/G2 Minor-Moderate storms by Day 2 (02 Jan) and eventually it is expected to become Quiet to Unsettled by Day 3 (03 Jan) (Kp0-3).

Energetic Particles / Solar Radiation: There is a slight chance of S1/Minor Radiation Storm enhancements during the period, should any significant flares occur from regions in the western hemisphere.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	60	30	5	10
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	50	40	40
Very Active	R3-R5 (X Class)	No	15	5	1	1

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	20	20	20	20
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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